GOVERNMENT OF INDIA
AGRICULTURE
LOK SABHA

UNSTARRED QUESTION NO:3819
ANSWERED ON:22.08.2005
NATIONAL AGRICULTURAL TECHNOLOGY PROJECT BY WORLD BANK
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Will the Minister of AGRICULTURE be pleased to state:

(a) the details of the achievements made by the national agriculture technology project introduced in 1998 in the country with the World Bank assistance, Year-wise;

(b) the expenditure occurred under the said project, year-wise;

(c) the details of the benefits availed by the States from this project, State-wise and Year-wise; and

(d) the details of next action plan of the Government under the national agriculture technology project?

Answer

THE MINISTER OF STATE IN THE MINISTRY OF AGRICULTURE(SHRI KANTILAL BHURIA)

(a) As per Annexure-I.

(b) As per Annexure-II.

(c) As per Annexure-III.

(d) The project is concluded on 30/6/2005. Preparation of the new phase is in progress.

Annexure-I

ACHIEVEMENTS − YEAR-WISE

ACHIEVEMENTS August, 1998-2000

The mode of research programmes was approved. Thus far in TOE (22 out of total 26). MM (18 out of total 38) and PSR and TAR (130 including IVLP/TAR, out of 230 listed) have already been commissioned. A total of 1,493 proposals (concept notes) were received under the CGP mode.

Under the ICAR, Zonal Research Stations (ZARSs) were selected in 53 districts to play the additional role of KVKs, where KVKs do not exist. These ZARSs are being strengthened for developing and testing location specific technologies. The Agricultural Technology Information Centres (ATICs) are also being established for providing single window support system, linking various units of a research institutions in the ICAR/SAUs.

ACHIEVEMENTS 2000-01

#A number of biotic, abiotic and socio-economic production constraints that limit the sustainable growth of rice-wheat cropping system were identified and prioritized in terms of their impact of yield loss.
Zero tillage technology showed an advantage in raising wheat productivity and reducing cost of production and weed density. The bed planting system in wheat indicated better plant height, darker green foliage and lesser weed population than conventional method of sowing.
The preliminary study indicated that sugarcane-based intercropping system involving Sesbania for green manure and cowpea for green pod appeared promising in controlling weed in spring-planted sugarcane. An intercropped dual-purpose cowpea also showed scope of mid-season income generation. Techniques for using pheromone traps to traps red palm weevil and rhinoceros beetle are being standardized . These two pests have become very serious in Goa and Andaman and Nicobar Islands. Other than rhinocerous beetle.
Lobster-holding facilities were selected for disease monitoring and evaluation of feeds. Methodologies for analysis of proximity composition (protein, fat, moisture, ash and minerals) of fish feed ingredient and prepared feed are being standardized.
Phytochemicals from neem-seed kernels, Pongamia glabra and Madhuka indica were purified and evaluated for their insect-control properties.
Under Plant biodiversity project, (a)undertaken more than 230 explorations, (b)collected more than 15,000 accessions, (c) received

more than 11,000 accessions by the National Gene Bank for medium-term storage, (d) developed three softwares, (e) published nine documents, (f) prepared 10 guidelines, (g) 3 checklists prepared, and (h) nine training schedules for grassroot-level workers prepared.
Protocols for purification of citrus ringspot, citrus mosaic and potato virus Y standardized, polyclonal antibodies prepared and evaluated in ELISA and ISEM system. Viroids in citrus and potato diagnosed by R-PAGE technique.
Methods to assess microbial and antimicrobial titre, hormonal and pesticide residues, adulterants in food from livestock and poultry were standardized.
Whiteness and brightness of jute fibre improved. Effect of non-woven structure on composite development studied. A few experiments carried out with coir and jute as reinforcing material with synthetic resins.

ACHIEVEMENT 2001-02

Two quality protein maize Shaktiman 1 and Shaktiman 2 identified and recommended for release in Bihar
Wheat planted on beds gave almost similar to better yields than conventionally planted wheat. Substantial saving in wheat seed for sowing and irrigation water was recorded with bed planting.
Deep ploughing before cotton sowing once in two years plus reduced tillage with rotavator plus herbicides application for early-season weed control gave significant cotton yield (2.13 tonnes/ha). Incorporation of wheat straw @ 6 tonnes/ha increased the seed-cotton yield significantly.
Cotton yield was best with seed treated with Azospirillum, followed by Azotobactor and Acetobactor:
Seeder-cutter/planter machine and an inter-row tillage equipment were developed. With the help of the machine, wheat and sugarcane can be sown or planted in single pass of the tractor. The red palm weevil management using pheromone traps was standardized for Goa, Tamil Nadu, Andaman and Nicobar Islands and Kerala.
Process for oilpalm-fibre extraction from empty bunches was standardized.
A manually operated coconut-splitting device was developed.
#Suitable rice-based cropping systems were identified at different centres in the salt-affected coastal soils.
Pearl production through tissue culture of P.fucatea mantle has been initiated. A rotary ball mill for shaping molluscan shell beads was designed, developed and fabricated.
Integrated rice-fish-piggery-duckery farming system showed good adoption among the tribal farmers at Ranchi.
M 35-1 sorghum proved the most suitable genotype, having high regeneration capacity in tissue-culture response.
Two GMS hybrids in cotton (AAHI and PKHVY 5), two varieties and one hybrid in sorghum (CSV 216 R, RSLG 262 and SPA 1010), four single- cross, early-maturing maize hybrids released for higher productivity. Male- sterile genotypes (CMS, GMS) and R lines resistant to cotton leaf curl virus and tolerant to bollworm were identified in cotton. Two CMS (GT 288A and 67 A) along with 20 fertility restorers were developed in pigeonpea.
Parental lines and hybrids resistant to multiple diseases were developed in tomato, brinjal, chillies and onion. Male-sterile lines were also developed and maintained.
Mechanized transplanting of rice including mat nursery raising and pudding was standardized.
Growth models of rice and wheat calibrated and validated for several Indian agro-environments.
A simple equipment, involving water-vacuum pump, for extraction of royal jelly was designed, developed and evaluated.
A method for isolation of good-quality RNA with satisfactory yields from mango and banana fruits (ripe and unripe) was standardized.
Transgenic tobacco plants carrying PA gene were developed.
All the 8 ZCUs and 29 DEEs in various SAUs were strengthened by providing modem information technology (IT) facilities for better co-ordination, and for making them more effective in carrying out extension activities respectively.

ACHIEVMENTS 2002-2003

Two training programmes dealing exclusively with GIS applications in agriculture were organized.
A technology for natural dye production from safflower petals has been developed which could provide the safflower farmers as much as 60-70% additional income.
Promising high bio-mass producing genotypes of sweet sorghum have been identified for alcohol production.
For boro rice cultivation improved technology packages including better seedling raising (Dapog method), protecting seedlings from cold injury, improved varieties and suitable date of sowing have been developed for different states
Three cotton genotypes viz; GSH-2, GSH-3 and GSH-4 have been identified as suitable for mechanical harvesting.
A model integrated coconut based farming system with high yielding forage grasses as intercrop and dairy wash for production of biogas and compost has been developed.
Drought tolerant and yellow mosaic virus resistant varieties of cowpea, mungbean cluster bean have been evolved for the Arid agro ecosystem.
To supplement income & nutrition, backyard poultry has been introduced into forty-six villages covering 750 farmers.
Scientific rearing technology developed for Angora rabbit at IVRI, Regional Centre, Mukteshwar helped the local farmers to generate an additional annual income of Rs.1500-2000 status with one pair of broiler rabbit.
Hybrids: 28 Hybrids of different crops (Rice − 3, Maize − 9, Sunflower − 5, Pearl millet − 3, Castor − 2, Cotton − 5, Sorghum − 1) with improved quality, high yield and disease resistance have been developed and released. 30 hybrids in vegetable crops having multiple disease resistance (tomato − 22, brinjal − 10 and chilli − 7) have been developed.
#A technology for packing ready-to-eat fish preparations in retortable pouches has been developed. The packing technology can be very useful for poularizing fish products, and for the use of the personnel's working in difficult terrains. The self-life of the packaged products is 1 year.
A user-friendly crop-modelling framework, Info Crop, has been developed and is being evaluated for potato, soybean, cotton, maize, sorghum, mustard, groundnut, and sugarcane.

A quantum jump from 1.5 to 2.9/ ha in the production of hybrid seed of rice, leading to reduction of seed cost and better adoption of hybrid technology has been achieved.
Tractor operated till-plant machine has been developed and tested. # 48 trainings were conducted in which 857 scientists from SAUs, ICAR institutes participated and learnt skills in new and emerging areas. These included 26 trainings in biotechnology in which 353 scientists were trained.
Increased longevity of anthurium flowers was observed by covering with polyphone sleeves/covers and packing in cardboard cartons. Addition of ethylene absorbent, potassium permanganate in cartons, further extend the post harvest longevity.
Technology for the production of various types of fish cakes and fish sausages using meat of different fish species viz,. catla, rohu, mrigal, silver carp, tilaipia and threadfin beam was developed.
Nicobari fowl was found to be resistant to many of the diseases of poultry.
Crossing of desi goats with improved buck (Betel buck) increased the number of kids by 50% and generated additional benefit cost ratio by 5.0 compared to the Desi goat crossed with Desi buck at Ranchi. 4/-

Paddy transplanted through engine-operated transplanter proved very effective in maintaining proper plant population. The return per rupee spent on paddy transplanter was Rs.3.03.
To reduce drudgery of women in paddy threshing manual paddy thresher was introduced which led to saving 200% time over manual threshing of paddy at Srinagar.
In order to empower the farmers, rural women, unemployed youths and other stakeholders, 1367 innovative training programmes based on their needs have been organized by which 33,342 farmers benefited.
About 9,600 soil samples were tested and 12,200 diseased plants were diagnosed. In veterinary clinics 39,638 animals were treated benefiting 61, 438 farmers. The ATICs generated a gross revenue of Rs. 5.3 crore.

ACHIEVEMENTS 2003-04

As per a survey, 90% of the ICAR Institutes and SAUs have already put LAN in place. Practically, all the institutes and SAUs (99%) are connected to Internet and 70% of them have developed their web sites. Six new SAUs have been provided funds for creation of LAN.
A new redesigned web site of the ICAR at www.icar.org.in has been launched with several new features. The web site includes links to Institutes and SAUs web sites. About 70% institutes and SAUs have developed their web sites, which are linked to ICAR site.
Bed planting of wheat, rice, maize and soybean has shown great promise, as it saves about 25% seed and 15-35% irrigation water, depending on soil type.
For the first time in the world, direct sensitive microfiter plate enzyme-immuno-assay (EIA) method was developed for estimation of oxytocin, LH, GH, FSH and PGFM.
#Dual-purpose breeds with higher egg and meat yield (1.5 kg in 8 - 10 weeks) reared on free-range scavenging with limited care and management compared to native birds increased the income of marginal farmers and landless labourers and improved the nutrition status of the poor families. It is also a viable enterprise for farm women.
Reduction in red weevil population (Rhyncophorus ferugineus) was achieved by mass trapping of its floating population of the red weevil in coconut gardens, thereby reducing the incidence of the pest on coconut palm.
In-oilseed based production system, NRC 2 groundnut and NRC 37 soybean gave 30 and 62% higher yield than local varieties at Indore.
Over 6,000 families at 47 locations in the tribal, backward and hilly areas in 15 states have benefited by the supply of quality seeds (48.3 tonnes) of improved varieties of life-support crops, seed (154 kg) and planting material (15,950 saplings) of fruit and vegetable crops, improved breeds of sheep (120), poultry (15,000) and pigs (562) and quality seed for freshwater aquaculture and technologies related to value-addition and post-harvest management.
In different crops, 37 hybrids (rice 8, maize 9, sunflower 5, pearl millet 4, castor 3, cotton 5, sorghum 3) with improved quality, higher yield (15-20% higher) and disease resistance were released. In vegetable crops, 59 hybrids (tomato, brinjal, chilli and onion) having multiple-disease resistance and higher yield (15-20% higher) and quality have been developed.
Major success was achieved in development and field testing of transgenic rice and cotton with Bt genes and in characterization of genes for protease inhibitor, ?-amylase inhibitor lectin, plant animal virus genomes.
Women in tribal, backward and hilly areas were empowered with implements to reduce drudgery in farm operations and also with technologies related to post-harvest agro-processing and value-addition. Programmes were organized for technological empowerment of 4,529 women.
A cDNA library has been constructed from control and heat-stressed rice seedlings and three full length hsp genes (hsp 16.9, hsp 17.3 and hsp18) have been isolated and characterized. Further, hsp18 gene was over-expressed in tobacco by Agrobacterium-mediated transformation.
Molecular markers have been identified for natural disease resistance in Nicobari fowl using RAPD −PCR. This will help in conservation of highly precious indigenous Nicobari fowl, a native of Andaman and Nicobar Islands.
Technologies were developed for hatchery production of marine ornamental fishes, especially clownfishes and damselfishes, for initiating a marine ornamental fish trade in India from hatchery produced fishes.
Techniques of Remote Sensing and Geographical Information System were applied in generating thematic maps, assessment and monitoring of agricultural drought and irrigation management to improve the water-use efficiency in command and catchment area of Rani Avanti Bai Sagar Project - a major irrigation project near Jabalpur.
The ATICs provided 80,240 farmers with diagnostic services through plant clinic, soil-testing laboratories and veterinary clinics.

ACHIEVEMENT 2004-2005

An Integrated National Agricultural Resource Information System (INARIS) has been developed involving a state-of-the-art Data Warehousing and GIS techniques.
The establishment of the "ICARNet" for connecting the libraries of 35 agricultural universities and 69 ICAR institutes, and 182 off campus colleges and regional stations executed by the ERNET will be completed by 31 March 2004.

An independent assessment of the impact of O&M reforms by the Tata Consultancy Services has brought out the commendable impact of NATP on efficiency of the Research and Technology development system in the NARS in general and the ICAR in particular. The assessment brought out clearly the role of systematic monitoring in making the system efficient.
Seven short-duration, short stature non-lodging, high-yielding basmati lines with 7.4-25.8 per cent yield superiority over the best check (local) and 1.7 to 2.5 tonnes/ha over Taraori Basmati have been identified for irrigated agro-eco-system.
To improve the productivity of old mango orchards, a technique of rejuvenation of old mango trees has been developed.
A tractor-operated hydraulic elevating worker-positioning platform for safe and efficient harvesting of fruits has been developed. The system can harvest about 70 kg fruits with pedicel easily per hour. The percentage loss of fruit drop is negligible.
There was a significant increase in the nut yield in the IPM palms under eriophyid mite of coconut (41 to 61 %). The Benefit: Cost Ratio was 3:1 to 4:1 respectively.
The castor hybrids GCH-6 and GCH-5 were found to be promising for cultivation under a moderately saline condition. The Gossipium herbaceum genotype RAHS 14 was found to be salinity tolerant and high yielding even under very adverse conditions.
Cultivation of oyster mushroom with producion of 1.0 kg to 1.2 kg/bed was popularised through women Self Help Group. A total 30, 280 agro forestry saplings were planted for restructuring the cyclone damaged plantation.
A power operated arecanut sprayer has been developed.
#Cultivation of crops in cold desert region of Jammu and Kashmir is possible only during the summer season. Greenhouse designs and crop production technology have been standardized for round the year vegetable production.
A chopper-cum-grinder has been fabricated that can grind all crop residues including cotton stalks, is useful for rural areas for the preparation of complete diets utilizing locally available crop residues. Suitable blower and a mixer can be attached with the machine.
An efficient Low Energy Precision Application (LEPA) Irrigation System working at low pressure (0.07-0.35 kg/cm2) for irrigating close-growing crops has been developed and evaluated in field. The system is reliable, low cost and requires less energy.
An eco-friendly method for utilization of slaughterhouse by-products has been developed which allows protein recovery from by products suitable for feeding pets and livestock. Several value added meat products have also been developed.
Twelve hybrids of different field crops (rice, maize, sunflower, pearl millet, castor, cotton and sorghum) with improved quality, higher yield (15-20%) and disease resistance have been developed and released. Fifty-nine hybrids of vegetable crops (tomato, brinjal, chilli and onion) having multiple disease resistance, higher yield (15-20% over control) and quality have been released.
A technology for pouch processing for fish curry preparation was commercialized. Technology for modified atmospheric packaging (MAP) for prawn, rohu and seer has been developed.
Drudgery in farm operation of women in tribal, backward and hilly areas has been reduced by the use of appropriate implements designed under the project. 5000 training programmes for farmers on various aspects of agriculture including livestock and fisheries were organized and 50,000 persons benefited from the training programmes.
490 frontline demonstrations for validation/testing of products/technologies were conducted under field conditions covering an area of 6,200 ha with farmers' participation and 3, 50,402 farmers adopted and/or are in the process of adopting the technologies.
Isolation and use of antiviral genes from plants is a relatively new concept. This has the advantage of relatively less likely opposition to use of these genes in the crop on horticultural plants.
Micropropagation protocols suitable for large-scale propagation of the high value medicinal plants Andrographis paniculata (Kalmegh), Bacopa monnieri (Brahmi), Centella asiatica (Koto Kola) and Swertia chirata (Chirata) have been developed.
Embryo technology developed as a bio- technological tool to enhance goat production and also developed a technique for intra-cervical collection of embryos so that the same animals can be used repeatedly for embryo harvesting.

An integrated farming model could generate an additional income of Rs 19,700/ha/year by reducing the cost of cultivation of the ensuing paddy crop after a fish crop, and through the additional yield of paddy realized under subsurface drainage and tapping the unutilised abundant water resources during the off-season by a fish crop in the acid-saline wetlands of Kerala.

Anneuxer – II

EXPENDITURE DETAILS

(Rupees in lakh)

Year	Expenditure
1997-98	561.32
1998-99	2835.40
1999-00	2675.22
2000-01	7579.74
2001-02	13956.56
2002-03	20645.15
2003-04	16625.30
2004-05*	10143.79
	(tentative)
Total	75022.48

Annexure – III

BENEFITS AVAILED BY THE STATES FROM NATP

In general, the project targeted all the states and UTs in India. However, in few cases, they were particularly targeting states/groups of states. Production System Research

Adoption of zero till drill technology in wheat has increased from 0.05 million ha during 2000-2001 to 1.27 million ha during 2004-2005. The technology was adopted in 1,500 villages comprising 82 districts in different transects of IGP which has saved Rs. 3302 millions to the farmers 2004-05 alone. More than 10,000 ZT drills were available with the farmers during 2003-2004 growing season of wheat.(Punjab, Haryana, UP, Bihar)

Intercropping in the interspaces of pruned mango is successful in generating income. Intercropping of potato in rabi and cucumber in zaid at Lucknow gave an additional income of 75,000/- per ha. The wood available due to pruning compensate to the loss of mango crop. (UP, WB)

In tribal areas of Jharkhand, West Bengal and Chhattisgarh, the yields of rainfed rice are low due to low input use. Since the holdings are small, tribals are unable to eke out livelihood from cropping alone.Two paddy based farming system models i.e. rice-fish-duck and rice-fish-pig were evaluated in Chhattisgarh, Jharkhand and West Bengal. The returns per rupee invested were Rs.3.17-3.75 in fish-cum-duck system and Rs.3.48-3.79 in fish-cum-pig system with different farmers in three states. By this integrated system the farmers can get Rs.8000-10000/ha/year as against Rs.4000-5000/ha/year with rice alone .

In medium lands with double cropping, rice followed by gram was found to be the most promising system at Raipur, Ranchi and Darisai achieving highest targeted yields and net income (Rs.11,360-17,624) from the cropping system as a whole. In low lands, gram and safflower at Raipur and gram at Ranchi were found to be most productive giving a total net return of Rs.12,000-15,000/ha on farmers fields.(Chhatisgarh,Jharkhand)

The American hirsutum cottons currently occupy 72% of the area in the country leaving 28% to the desi cottons The steadily increasing cost of cultivation of hirsutum hybrids has been posing problems to cotton growers particularly in rainfed areas. Superior quality arboreums like MDL 2463, DLSA-17 and PA-402 for A.P., Karnataka and Maharashtra with comparable yields to that of hirsutums but lower cost of cultivation and greater stability during drought years were identified. The varieties became popular in more than 100 villages in 8 target districts of above states. 250 farmers in 3 states benefited from these trials with an average saving on cost of cultivation ranging from Rs.2000 to Rs.2500/ha. There was also 65% reduction in pesticide use in the adopted villages.

Fuel grade alcohol could be produced from stalks and grains of sweet sorghum. On an average 400 liters of alcohol was produced from one tonne of sorghum grains and 90 litres of alcohol from one tonne of stalks. It helped in enhancing the net economic returns of the farmers by Rs 10,000 / ha (Rs 5000 each from grains and stalks). Two promising genotypes, viz NSS-104 and RSSV-9 have been identified for Andhra Pradesh, Maharashtra and Tamil Nadu. A contract farming model has been worked out on 1000 ha in Belgaum (Karnataka) with a private industry.

In order to have value addition the extraction method of yellow dye from safflower petals was scaled up to pilot level. A unique herbal health drink saffo-tea was also made from safflower petals. Eight small entrepreneurs in Maharastra evinced interest on natural dye and saffo tea technology. In order to reduce drudgery in hand picking in safflower harvesting, a cost effective power operated prototype of safflower has been designed and it's field efficiency were 98.2 and 87 %, respectively.

In low rainfall areas moisture conservation was emphasized while in high rainfall areas surplus water was harvested and recycled for supplemental irrigation. Studies indicated that 40−60% of surplus run off could be recycled for rice crop during drought period or subsequent rabi crop. A 1000 m3 on-farm reservoir saved about 1 ha of rice. In the project area (45 ha) served by the water harvesting structures the crop recorded 10% higher yields than the non-project area. This remarkable impact during the drought year convinced Government of Chhatisgarh that decided to construct 200 000 such structures on farmers' fields during the next two years This technology generated interest amongst the farmers of Jharkhand, Orissa and MP too.

Oil palm has a gestation period of three years during which period the farmer does not get any income and a compatible intercrop could give additional income during the juvenile phase. In this technology oil palm is planted at a spacing of 9x9x9m and during its juvenile phase, different intercrops such as banana, chillies, tobacco, ridge gourd, guinea grass, bhendi, colocasia, maize and moringa can be grown. Among the intercrops, banana revealed the high net income (Rs. 10,498/-) in Andhra Pradesh and Gujarat. Technology was adopted by almost 100 per cent of the oilpalm farmers.

A coconut based farming system comprising coconut,fodder crops, banana, pepper, mulberry,diary,poultryand pisciculture was developed at CPCRI,Kasargod. The output obtained was 23535 coconuts,11445 l of milk,645 kg of broiler birds, 173 kg fish, 17.3 kg of silk worm cocoon, 3477 quail eggs and 87 kg of banana. Thus, the total revenue obtained from the system was Rs. 251311. The net return obtained from the system was Rs. 73142 per annum (Kerala).

For the management of salt affected soils in the coastal region of West Bengal application of leaves of locally available trees to soil @5t ha-1 along with inorganic N fertilizer and application of city compost was found superior. For the coastal soils of Aandhra Pradesh and Tamil Nadu application of Gliricidia @ 5t ha-1 along with inorganic N fertilizer and leaves of Derris indica were found appropriate respectively.

In Kerala a starter feed for ducklings was prepared and the know-how of feed formula was transferred to m/s. KSE Ltd, Kerala for large scale production.

A bio-intensive feasible and refined IPM technology has been developed for the control of Rhinoceros beetle in plantation crops which includes (1) release of baculovirus (2) application of Metarhizium anisopliae (3) use of pheromone lure. (Kerala, A.P, Karnataka)

Animal Feed Block Making Machine was developed at IARI, New Delhi. As of now, the basic cost of machine is Rs.5.0 lakhs and the cost of block preparation was Rs. 375 per tonnes. The break-even point for making profit for this machine is 105 ton. The blocks will facilitate easy and cost effective transportation of fodder for long distances during scarcity period. Twelve machines are in operation at SAUs and private entrepreneurs.

Legumes occupy 35% area in arid region. Four drought tolerant genotypes of cowpea, three of cluster bean and three of mungbean have been identified for higher yield and tolerant to drought conditions. (Rajasthan)

Senna is a drought hardy, browsing proof medicinal plant, ideal for degraded lands giving net returns of Rs. 9000 ha-1 with export potential of Rs. 11.2 crores. High yielding Tuticorin and Bikana cultivars (8-10 q ha-1 yr-1) varieties identified. (Rajasthan,Gujrat)

Henna is a commercial crop having high export potential capacity of Rs. 80-100 crores. Sojat area of Marwar region is very famous. High yielding varieties such as MH-1 and MH-2 with 2.7-3.0% lawsone identified. Its cultivation has spread to 35,000 ha in Rajasthan and Gujarat.

Kala zeera, a high value spice of cold desert is used for soft drinks and medicines. Its productivity is low and is at the verge of extinction. A promising genotype SKUKZ-Shong has been identified which yields 293 kg seeds ha −1 with 7.4% oil. It has been

spread to 373 ha in Srinagar, Kinnaur, Lahaul Spiti and Chamba districts.
Improved greenhouses designed under NATP increased temperature and humidity by 9-13 0C & 3-13% making vegetable cultivation economically possible during winters.(HP)
Capparis decidua, an important shrub of arid region producing fruits for pickles and medicinal value, is very slow growing. It is extremely drought hardy and can grow on a terrain, where cultivation of crops is difficult. Its propagation through seeds is very difficult. To overcome this problem vegetative propagation has been standardized. (Rajasthan,Gujarat)
Four improved genotypes CARI Nirbheek is for all climatic zones, CARI Shyama for Tribal belt of MP, Hitcari for humid and coastal region and Upcari for arid region with a potential to produce 160-210 eggs and attain 1700-2000 gm adult body weight have been utilized for back yard poultry. A farm family earns Rs. 400-500 month -1 by selling eggs & birds, besides nutrition improvement of the family by consuming 8-9 eggs week -1. Economic impacts of the project were evaluated on the basis of data collected from 50 beneficiaries (10 from each of 5 villages) selected randomly out of 490 beneficiaries belonging to 16 villages in three blocks of Bareilly district in Uttar Pradesh.
Under double cropping system along with winter wheat or spring wheat, Faba beans and with potato; radish or turnip can be cultivated. Intercropping increased yield by 30.6 and 43.5 percent over sole potato and sole wheat crop with an additional income of Rs 0.46 and 0.38 lakh/ha, respectively at high altitudes in Kashmir. At Lahaul and Spiti (HP), two crops of pea can be taken, viz; pea var. Azad P-1 followed by pea var. Arkel with increase in cropping intensity by 100 to 200% and productivity from 109.6 to 460 q/ha over farmers' practice. Net returns from double cropping system ranged from Rs 0.76/- lakh/ha in wheat-vegetable sequence and Rs 1.45 lakh/ha in pea-pea cropping sequence.
Jute and coir geotextile (Bhoovastra) have been successfully applied for soil conservation and reclamation of degraded steep sloping lands (land slide affected/ prone areas). The cost of application of geotextile with minor soil conservation works (check dams etc.) has been worked out as Rs. 38 per sq. m. The area can be reclaimed within a period of 3-4 years. By constructing gabion structures (cost Rs. 700/ cu.m.) at Sainji watershed (near Mussoorrie, Uttaranchal), 2039 tonnes of sediments were arrested which saved about eight hectares of agri-terraced land from sliding down and also stopped blockages of irrigation channel thus ensuring regular water supply to the village. The technology is now widely recommended for adoption by the Govt. of Uttaranchal in landslide affected areas.

MISSION MODE

Awareness about rich biodiversity in respect of plant, animal and fish.
Economic empowerment of people in tribal, hilly and backward region of 15 states leading to food and nutritional security through technologies developed in the project.
38 hybrids in different crops (rice, maize, sorghum, pearl millet, pigeon pea, sunflower, castor, cotton) released and their performance demonstrated in farmers' field.
Immuno-Diagnostic Kits for plant and animal diseases developed and tested under field conditions. Germ free superior planting material is available to farmers.
IPM technology has been undertaken in 132 villages of 17 districts in 8 states covering 1750 farm families over 2022 ha of land.
Technologies for value added products from jute, soybean, fish developed and commercialized and farmers are getting benefit of it.
Drudgeries of women in tribal, backward and hilly areas associated with agriculture and allied work have been reduced by empowering them with technologies related to different operations including post-harvesting agro-processing and value addition.

TEAM OF EXCELLANCE (TOE)

The accomplishments made in TOEs are applicable for all the states of India.
Under HRD programme, critical mass of scientists have been trained for different states in the frontier areas of science.

ATICs and ZARSs

Strengthening of Directorates of Extension Education in State Agricultural Universities and Zonal Coordinating Units to empower Directors of Extension and Zonal Coordinators to run extension system efficiently.
The ATICs in different states have provided single window support system to farmers.
The remandating and strengthening of Zonal Agricultural Research Stations (ZARSs) have trained farmers, farm women and rural youth.
These remanadted ZARSs have conducted 7705 FLDs in 1745.43 ha of land.
They have also produced 16291.88 q. of seed of improved varieties and 1236914 No. of planting material of different crops.
Subsequently these remandated ZARSs were converted into full fledged Krishi Vigyan Kendras (KVKs) in different states.